IEC 60335-2-7

Edition 7.1 2012-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Household and similar electrical appliances – Safety – Part 2-7: Particular requirements for washing machines

Appareils électrodomestiques et analogues – Sécurité – Partie 2-7: Règles particulières pour les machines à laver le linge

IEC 60335-2-7:2008+A1:2011

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

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FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

This consolidated version of IEC 60335-2-7 consists of the seventh edition (2008) [documents 61/3564/FDIS and 61/3653/RVD] and its amendment 1 (2011) [documents 61/4279/FDIS and 61/4302/RVD]. It bears the edition number 7.1.

The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience. A vertical line in the margin shows where the base publication has been modified by amendment 1. Additions and deletions are displayed in red, with deletions being struck through.

This part of International Standard IEC 60335 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances.

The principal changes in this edition as compared with the sixth edition of IEC 60335-2-7 are as follows (minor changes are not listed):

– the text of some notes in the identified subclauses has been converted to normative text (3.1.9, 5.7, 10.1, 10.2, 11.7, 18.101, 19.101, 20.101, 20.103, 22.6, 22.101, 22.103, 22.104, 23.101, AA.1, AA.2 and Clause 4 of Annex BB);
– the spillage test has been made applicable to all washing machines (15.2);
– additional requirements concerning the accessibility of mechanical release mechanisms have been added (22.105);
– requirements for washing machines employing an electrolyte, instead of detergent, have been introduced in Annex CC;
– the requirements for power driven wringers have been moved to informative Annex DD.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments. It was established on the basis of the fourth edition (2001) of that standard.

NOTE 1 When “Part 1” is mentioned in this standard, it refers to IEC 60335-1.

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Safety requirements for electric washing machines.

NOTE 2 The following annexes contain provisions suitably modified from other IEC or ISO standards.

Annex AA	Detergent and rinsing agent	IEC 60436 and IEC 60456
Annex BB	Ageing test for elastomeric parts	ISO 1817

When a particular subclause of Part 1 is not mentioned in this part 2, that subclause applies as far as is reasonable. When this standard states “addition”, “modification” or “replacement”, the relevant text in Part 1 is to be adapted accordingly.

NOTE 3 The following numbering system is used:

– subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;
– unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause;
– additional annexes are lettered AA, BB, etc.

NOTE 4 The following print types are used:

– requirements: in roman type;
– *test specifications: in italic type;*
– notes: in small roman type.

Words in **bold** in the text are defined in Clause 3. When a definition concerns an adjective, the adjective and the associated noun are also in bold.

A list of all parts of the IEC 60335 series, under the general title: *Household and similar electrical appliances – Safety*, can be found on the IEC website.

NOTE 5 The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations may need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

It is the recommendation of the committee that the content of this publication be adopted for implementation nationally not earlier than 12 months or later than 36 months from the date of publication.

The following differences exist in the countries indicated below.

– 3.1.9: Different size cloths are used. The initial water temperature for machines without heating elements and without a wringer is 71 °C (USA).

– 6.1: Class 01 appliances are allowed (China and Japan).

– 6.2: IPX0 appliances are allowed (Canada and USA).

– 11.7: The test durations are different (USA).

– 15.101: The test is different (USA).

– 19.7: Appliances without a programmer are operated until steady conditions are established (USA).

– 19.101: A redundant set of contacts is not required (USA).

– 22.6: The test is different (USA).

– 22.101: The test is carried out at twice the permissible inlet pressure or 2,0 MPa, whichever is higher (Norway).

– 22.101: The test is not carried out (USA).

– Annex AA: The detergent and rinsing agent are different (USA).

– Annex BB: Different tests are carried out (USA).

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

NOTE 6 The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations may need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

It is the recommendation of the committee that the content of the amendment 1 be adopted for implementation nationally not earlier than 12 months or later than 36 months from the date of publication.

The contents of the corrigendum of September 2012 have been included in this copy.

IMPORTANT – The "colour inside" logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.

INTRODUCTION

It has been assumed in the drafting of this International Standard that the execution of its provisions is entrusted to appropriately qualified and experienced persons.

This standard recognizes the internationally accepted level of protection against hazards such as electrical, mechanical, thermal, fire and radiation of appliances when operated as in normal use taking into account the manufacturer's instructions. It also covers abnormal situations that can be expected in practice and takes into account the way in which electromagnetic phenomena can affect the safe operation of appliances.

This standard takes into account the requirements of IEC 60364 as far as possible so that there is compatibility with the wiring rules when the appliance is connected to the supply mains. However, national wiring rules may differ.

If an appliance within the scope of this standard also incorporates functions that are covered by another part 2 of IEC 60335, the relevant part 2 is applied to each function separately, as far as is reasonable. If applicable, the influence of one function on the other is taken into account.

NOTE 1 For example, if appliances within the scope of this Part 2

– have a separate spin container for water extraction, IEC 60335-2-4 is also applicable as far as is reasonable;

– have a drying function, IEC 60335-2-11 is also applicable is applicable as far as is reasonable.

When a part 2 standard does not include additional requirements to cover hazards dealt with in Part 1, Part 1 applies.

NOTE 2 This means that the technical committees responsible for the part 2 standards have determined that it is not necessary to specify particular requirements for the appliance in question over and above the general requirements.

This standard is a product family standard dealing with the safety of appliances and takes precedence over horizontal and generic standards covering the same subject.

NOTE 3 Horizontal and generic standards covering a hazard are not applicable since they have been taken into consideration when developing the general and particular requirements for the IEC 60335 series of standards. For example, in the case of temperature requirements for surfaces on many appliances, generic standards, such as ISO 13732-1 for hot surfaces, are not applicable in addition to Part 1 or part 2 standards.

An appliance that complies with the text of this standard will not necessarily be considered to comply with the safety principles of the standard if, when examined and tested, it is found to have other features that impair the level of safety covered by these requirements.

An appliance employing materials or having forms of construction differing from those detailed in the requirements of this standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be considered to comply with the standard.

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-7: Particular requirements for washing machines

1 Scope

This clause of Part 1 is replaced by the following.

This International Standard deals with the safety of electric washing machines for household and similar use, that are intended for washing clothes and textiles, their **rated voltage** being not more than 250 V for single-phase appliances and 480 V for other appliances.

This standard also deals with the safety of electric washing machines for household and similar use employing an electrolyte instead of detergent. Additional requirements for these appliances are given in Annex CC.

NOTE 101 Guidance is given in Annex DD for requirements that may be used to ensure an acceptable level of protection against electrical and thermal hazards for washing machines fitted with a power driven wringer.

Appliances not intended for normal household use but which nevertheless may be a source of danger to the public, such as appliances intended to be used by laymen in shops, in light industry and on farms, are within the scope of this standard.

NOTE 102 Examples of such appliances are washing machines for communal use in blocks of flats or in launderettes.

As far as is practicable, this standard deals with the common hazards presented by washing machines that are encountered by all persons in and around the home. However, in general, it does not take into account

– persons (including children) whose
  - physical, sensory or mental capabilities; or
  - lack of experience and knowledge

  prevents them from using the appliance safely without supervision or instruction;
– children playing with the appliance.

NOTE 103 Attention is drawn to the fact that

– for washing machines intended to be used in vehicles or on board ships or aircraft, additional requirements may be necessary;
– in many countries additional requirements are specified by the national health authorities, the national authorities responsible for the protection of labour, the national water supply authorities and similar authorities.

NOTE 104 This standard does not apply to

– washing machines intended exclusively for industrial purposes (ISO 10472-2);
– appliances intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas).

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 60456, *Clothes washing machines for household use – Methods for measuring the performance*

IEC 60730-2-12:2005, *Automatic electrical controls for household and similar use – Part 2: Particular requirements for electrically operated door locks*

ISO 1817:2005, *Rubber, vulcanized – Determination of the effect of liquids*

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1.9 *Replacement:*

normal operation
operation of the appliance under the following conditions

The appliance is filled with dry textile material having a mass equal to the maximum mass stated in the instructions, and with the maximum quantity of water for which it is constructed. However, if the power input or current is higher when only 50 % of the textile material is used, the appliance is operated with this load instead if this gives more unfavourable conditions than the full load during the test of Clause 11.

NOTE 101 For some appliances incorporating a programmer, using the 50 % reduced load may result in automatic selection of a reduced wash programme.

The temperature of the water is

– 65 C ± 5 °C for appliances without heating elements;
– 15 °C ± 5 °C for appliances without heating elements and intended for connection to the cold water supply only;
– 15 °C ± 5 °C for other appliances.

If the appliance does not incorporate a programmer, the water is heated to 90 °C ± 5 °C or as high as the construction will allow if lower, before starting the first washing period.

The textile material consists of pre-washed double-hemmed cotton sheets having dimensions approximately 700 mm × 700 mm and a specific mass between 140 g/m^2 and 175 g/m^2 in the dry condition.

For impeller type washing machines, if the textile material does not move properly during operation,

– the quantity of textile material may be reduced until the maximum power input of the motor is attained, or

– a textile material comprising pre-washed double-hemmed cotton sheets, having dimensions of approximately 900 mm × 900 mm and a mass between 90 g/m^2 and 110 g/m^2 in the dry condition, may be used.

However, for impeller type washing machines, in case of doubt, the test is carried out using the reduced quantity of textile material.

4 General requirement

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

5.2 *Addition:*

The relevant tests of 21.101, 21.102 and 22.104 shall be carried out on the same appliance as that used for the test of Clause 18.

5.3 *Addition:*

The test of 15.101 is carried out before the test of 15.3.

The relevant tests of 21.101 and 21.102 are carried out before the test of Clause 18. The test of 22.104 is carried out after the test of Clause 18.

5.7 *Addition:*

Doubt is considered to exist if the temperature of the water is within 6 K of the boiling point and the difference between the temperature rise of the relevant part and the limit specified does not exceed 25 K minus the room temperature.

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 *Modification:*

Appliances shall be of **class I, class II** or **class III**.

6.2 *Addition:*

Appliances shall be at least IPX4.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 *Addition:*

Appliances without automatic water level control shall be marked with the maximum water level.

Appliances not intended for connection to the hot water supply and not provided with heating elements shall be marked with the substance of the following:

CAUTION: Do not connect to the hot water supply.

7.10 *Addition:*

If the **off position** is only indicated by letters, the word "off" shall be used.

7.12 *Addition:*

The instructions shall specify the maximum mass of dry cloth in kilograms to be used in the appliance.

7.12.1 *Addition:*

For washing machines having ventilation openings in the base, the installation instructions shall state that the openings must not be obstructed by a carpet.

7.15 *Addition:*

The caution relating to connection to the hot water supply shall be on the appliance at its point of attachment to the water supply.

8 Protection against access to live parts

This clause of Part 1 is applicable.

9 Starting of motor-operated appliances

This clause of Part 1 is not applicable.

10 Power input and current

This clause of Part 1 is applicable except as follows.

10.1 *Addition:*

The selected representative period is the period, such as filling with water, washing, rinsing, water extraction, spinning or braking, during which the power input is the highest.

10.2 *Addition:*

The selected representative period is the period, such as filling with water, washing, rinsing, water extraction, spinning or braking, during which the current is the highest.

11 Heating

This clause of Part 1 is applicable except as follows.

11.7 *Replacement:*

Appliances incorporating a programmer are operated for three cycles with the programme that results in highest temperature rises, with a rest period of 4 min between cycles.

Other appliances are operated for three cycles, with a rest period of 4 min between cycles. Each cycle consists of the following operations:

– *for appliances without means for water extraction and for washing machines with a hand-operated wringer,*	*washing;*
– *for appliances having a single drum for washing and water extraction,*	*washing followed by water extraction;*
– *for appliances having separate drums for washing and water extraction that cannot be used simultaneously,*	*washing and water extraction separated by an additional 4 min rest period;*
– *for appliances having separate drums for washing and water extraction that can be used simultaneously,*	*washing together with water extraction so that the operations terminate simultaneously;*
– *for appliances having a single drum for washing, water extraction and drying*	
• *that allow the same quantity of textile material to be washed and dried in the drum,*	*washing followed by water extraction, followed by drying;*
• *that, according to the instructions, only allow a portion of the washed textile material to be dried in the drum,*	*washing followed by water extraction followed by two drying periods, with an additional rest period of 4 min before each drying period. In this case only two cycles of operation are carried out.*

For appliances incorporating a timer, the washing period, the water extraction period and the drying period are equal to the maximum period allowed by the timer.

For appliances without a timer,

– *the washing period has a duration of*
  - *6 min, for washing machines of the continuously rotating impeller type,*
  - *18 min, for washing machines of the agitator type,*
  - *25 min for washing machines of the drum type, unless a longer period is stated in the instructions;*
– *the water extraction period has a duration of 5 min.*

The rest period, including any braking time, has a duration of 4 min.

After the specified sequence of operation, discharge pumps that are driven by a separate motor and switched on and off manually, are subjected to three operating periods separated by rest periods of 4 min. Each operating period is equal to 1,5 times the period necessary to empty the appliance when filled to the maximum normal water level. The outlet of the water discharge pipe is 900 mm above the floor.

12 Void

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable except as follows.

13.2 *Modification:*

*For **stationary class I appliances**, the leakage current shall not exceed 3,5 mA, or 1 mA/kW of **rated power input** with a limit of 5 mA, whichever is greater.*

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable except as follows.

15.2 *Replacement:*

Appliances shall be constructed so that spillage of liquid in normal use does not affect their electrical insulation even if an inlet valve fails to close.

Compliance is checked by the following test.

*Appliances with **type X attachment**, except those having a specially prepared cord, are fitted with the lightest permissible type of flexible cord of the smallest cross-sectional area specified in Table 13.*

Appliances intended to be filled with water by the user are completely filled with water containing approximately 1 % NaCl. A further quantity of this solution equal to 15 % of the capacity of the appliance or 0,25 l, whichever is greater, is poured in steadily over a period of 1 min.

Other appliances are operated until the maximum water level is reached, and 5 g of the detergent specified in Annex AA is added for each litre of water in the appliance. The inlet valve is held open and the filling is continued for 15 min after first evidence of overflow or until the inflow is automatically stopped by other means.

For appliances that are loaded from the front, the door is then opened if this can be achieved manually and without damage to the door interlock system.

For all appliances, 0,5 l of water containing approximately 1 % NaCl and 0,6 % of rinsing agent, as specified in Annex AA, is poured over the top of the appliance, the controls being placed in the on position. The controls are then operated through their working range, this operation being repeated after a period of 5 min.

*The appliance shall then withstand the electric strength test of 16.3 and inspection shall show that there is no trace of water on insulation that could result in a reduction of **clearances** or **creepage distances** below the values specified in Clause 29.*